

CDFA- Nitrous Oxide Emission Stakeholders Meeting Report Thursday 2nd June 2011

Reporting Period: January 25th – May 31st 2011

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Project Title: Measuring and modeling nitrous oxide emissions from California
cotton, corn, and vegetable cropping systems

Agreement No.: 09-0001

Short project name used by Fresno State Foundation: CDFA-Nitrous Oxide Emission '12

Fresno State Foundation Cost Center Number: 350027

Contract Term: July 1, 2009 to May 31, 2012

Period covered by this report: January 25th to May 31st 2011

Have expenditures exceeded the amount allocated for the reporting period: NO

If “Yes”, then explain any Modifications to Project/Budget:
Not Applicable.

Project Objectives:

The overall goals of this project are to: (1) determine detailed time series of nitrous oxide (N₂O) fluxes and underlying factors at crucial management events (irrigation, fertilization, etc.) in representative agro-ecosystems in Central Valley of California; and (2) use the intensive data on N₂O fluxes to calibrate and validate processed based biogeochemical De-Nitrification - De-Composition model (DNDC). Specific objective of this phase of the project funded by CDFA is to determine N₂O flux measurements for cotton and silage corn systems grown in the central San Joaquin Valley (SJV).

Summary of accomplishments & any significant findings during this reporting period:**1. Significant Progress Against Objectives:**

- The corn and cotton experimental sites have been identified. For both crops there will be research plots on the Fresno State campus farm. These sites will be used primarily for methodology development and evaluation of the reliability and accuracy of the monitoring equipment. In 2011, when the crops are fully established, N₂O emissions will be measured within subplots subjected to different fertilizer rates. In early June we will install 16 flux chambers in a cotton experiment being conducted by Dr. Roberts in which he will compare various rates of slow release and conventional N fertilizers. Also, we will continue taking measurements at the two Hanford cotton sites.
- For the two silage corn sites at the Hanford dairy, extensive measurements will begin within the next two weeks as the farmer removes his winter wheat and will seed his summer corn. The relatively cooler and wetter conditions in the Central Valley has delayed field operations this year. We expect to conduct sampling on a more frequent basis during the 2011 summer. As indicated earlier, the dairyman has provided two experimental locations, on which we can conduct periodic measurements over the next two years, in order to compare N₂O emissions from silage corn fertilized with dairy effluent and the traditional urea ammonium nitrate (UAN), respectively. Sixteen chambers have need installed in each of these sites.
- Because of the availability of matching funds from the ARI funded project we are currently exploring an additional cotton site and a fresh market tomato site in the Firebaugh area and out at the UC Westside Field station. Sampling at these sites will also be part of 2011 summer sampling program.

2. Concluding remarks:

- Data from field measurements are currently being analyzed and so no scientific conclusions are possible at this time.
- From the measurements in the tomato fields with the INNOVA 1412 we found that the technique with the Photoacoustic Field Gas-Monitor facilitated the rapid collection of N₂O and CO₂ concentration data from areas enclosed within a flux chamber. We

will continue to measure CO₂ emissions whenever we collect N₂O by using either the INNOVA 1412 device or a rapid CO₂ analyzer available from PP Systems.

- Our major limitation and drawback to having N₂O data processed in timely manner is that our in house Gas Chromatograph (GC) continues to have computer problems. Hence we have now teamed up with another researcher in the Viticulture department at Fresno State to assist with the analyses. We are also collaborating with the City of Fresno Waste Water Treatment Facility to have access of their GC in accordance with an existing MOU. Unfortunately, because of the workload at the UC Davis (Dr. Martin Burgers' group) lab, we can longer expect them to analyze the N₂O samples.
- Delays in obtaining the equipment and related parts needed for constructing the monitoring devices have been resolved and we anticipate collecting a large number of samples over the summer. We should be able to present some scientific data at the next meeting planned for September 2011.